

Program: BS (CS)-4
Course Name: Computer Architecture
Course Code: CS-411
Credit Hours: 03
Total Weeks: 16
Total Hours: 48

COURSE OBJECTIVES:

The course covers the basic principles of micro-computer architecture, its organization, operation and performance. It also deals with embedded systems, peripheral devices, memory management, and processor family evolution patterns. The course includes the cache memory, its organization and mapping functions, PCI, role of secondary storage and RAID implementations, I/O operations, I/O devices interrupt mechanism, Firewire, and Infiniband in detail. This course will help and prepare the students to take Advance courses in Computer Architecture in future.

Week-1 **INTRODUCTION**

Computer Organization and Architecture
Structure and Function
Function
Structure
Why Study Computer Organization and Architecture?

COMPUTER EVOLUTION AND PERFORMANCE

Week-2

A Brief History of Computers
The First Generation: Vacuum tubes
ENIAC
The von Neumann Machine
Commercial Computers
The second Generation: Transistors

Week-3

The IBM 7094
The Third Generation: Integrated Circuits
Microelectronics
IBM system /360
DEC PDP-8
Later Generations
Semiconductor Memory
Microprocessors

Week-4 Designing for Performance

Microprocessor Speed
Performance Balance
Improvements in Chip Organization and architecture
Pentium and Power PC Evolution
Pentium

cslearnererr.com

A TOP-LEVEL VIEW OF COMPUTER FUNCTION AND INTERCONNECTION

Week-5

- Computer Components
- Computer Function
 - Instruction Fetch and Execute
 - Interrupts

Week-6

- Interrupts and the Instruction Cycle
 - Multiple interrupts
 - I/O Function

Week-7

- Interconnection Structures
- Bus Interconnection
 - Bus Structure
 - Multiple Bus Hierarchy
 - Element of Bus Design
 - Bus types
 - Method of Arbitration
 - Timing
 - Bus width
 - Data Transfer

Week-8

- PCI
 - Bus Structure
 - PCI Commands
 - Data Transfers
 - Arbitration

CACHE MEMORY

Week-9

- Computer Memory System Overview
 - Characteristics of Memory Systems
 - The Memory Hierarchy

Week-10

- Cache Memory Principles
- Elements of Cache Design
 - Cache Size
 - Mapping Function
 - Direct Mapping
 - Associative Mapping
 - Set associative Mapping

Week-11

- Replacement Algorithms
- Write Policy
- Line Size
- Number of Caches
 - Multilevel Caches
 - Unified verses Split Caches

Pentium 4 and PowerPC Cache Organization
Pentium 4 Cache Organization
PowerPC Cache Organization

INTERNAL MEMORY

Week-12

Semiconductor Main Memory
Organization
DRAM and SRAM

Week-13

Dynamic RAM
Static RAM
SRAM verses DRAM
Types of ROM

Week-14

Chip Logic
Chip Packing
Module Organization
Error Correction

Week-15

Advance DRAM Organization
Synchronous DRAM
Rambus DRAM
DDR SDRAM
Cache DRAM

EXTERNAL MEMORY

Week-16

Magnetic Disk
Magnetic Read and Write Mechanisms
Data Organization and Formatting
Physical Characteristics
Disk Performance Parameters
Seek Time
Rotational Delay
Transfer Time
A Timing Comparison

RECOMMENDED BOOK:

**COMPUTER ORGANIZATION AND ARCHITECTURE 7th Edition, William Stallings
Prentice-Hall International, Inc.**

REFERENCE BOOK:

COMPUTER ARCHITECTURE, 2nd Edition, Hennessy, Patterson

**COMPUTER ARCHITECTURE AND ORGANIZATION, B.Govindarajalu
Tata McGraw-Hill Publishing Company Ltd.**